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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/010,696	12/05/2001	Visvamohan Yegnashankaran	072219-0261614 (P05088)	7056

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07/18/2002

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EXAMINER

VU, QUANG D

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 07/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/010,696

Applicant(s)

YEGNASHANKARAN ET AL.

Examiner

Quang D Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10, 22 and 23 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 22 and 23 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other: ____

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 11-21, 24 and 25, drawn to method of forming a multilevel metal interconnect, classified in class 438, subclass 622.
- II. Claims 1-10, 22 and 23, drawn to multilevel metal interconnect device, classified in class 257, subclass 758.

During a telephone conversation with Mark Pickering on 05/22/2002 a provisional election was made without traverse to prosecute the invention of group I, claims 1-10, 22 and 23. Affirmation of this election must be made by applicant in replying to this Office action. Claims 11-21, 24 and 25 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 4 recites the limitation "... bottom surface has multiple levels" in line 8. The specification does not support the claimed limitation.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 5, 22 and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 recites the limitation "...bottom surface of the trench..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 22 recites the limitation "...the trenches..." in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 23 recites the limitation "...first trench contacts a second trench" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

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(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

6. Claims 1-5, 7-9 and 22-23 are rejected under 35 U.S.C. 102(b) as being anticipated by US

Patent No. 6,262,446 to Koo et al.

Regarding claim 1, Koo et al. teach a multilevel metal interconnect formed on a semiconductor substrate, the semiconductor substrate having a plurality of active areas, the multilevel metal interconnect comprising:

a plurality of layers of insulation material (12, 30, 34), the plurality of layers of insulation material including a first layer of insulation material and a top layer of insulation material, the first layer of insulation material being formed on the semiconductor substrate (10);

a corresponding plurality of patterned metal layers (16a-e; 32a-d; 36a-d) formed on the layers of insulation material so that each patterned metal layer is formed on a corresponding layer of insulation material, the plurality of patterned metal layers including a first patterned metal layer and a top patterned metal layer, the first patterned metal layer being formed on the first layer of insulation material;

a plurality of contacts (14a-e) formed through the first layer of insulation material to make electrical connections with the active areas and the first patterned metal layer;

a plurality of via (first portion of 32a-d and 36a-d) formed through the plurality of layers of insulation material other than the first layer of insulation material, the vias making electrical connections with adjacent patterned metal layers.

a capacitive structure (20) formed between adjacent metal lines of a patterned metal layer, the capacitive structure being formed from a dielectric material (17a), the dielectric material

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being different from one of the layers of insulation material (see figures 1-4; column 5, line 24 – column 6, line 60).

Regarding claim 2, Koo et al. teach a plurality of trenches formed in the layers of insulation material each trench adjoining metal lines of the top patterned metal layer, a trench extending from the top metal layer between metal lines of the top metal layer through the top insulation layer and between metal lines of a metal layer lying below the top metal layer, each trench having a bottom surface (see figure 4; the portion of 32c, 36b, 32d, 36c, 36d).

Regarding claim 3, Koo et al. teach the bottom surface has a single level (see figure 4; first portion of 32d has single level).

Regarding claim 4, Koo et al. teach the bottom surface has multiple levels (see figure 4; the right hand portion of 36b has multiple levels).

Regarding claim 5, Koo et al. teach the bottom surface of the trench is spaced apart from a top surface of the semiconductor substrate (see figure 4; the portion of 32c, 32d, 36b, 36c and 36d is spaced apart from a top surface of the substrate).

Regarding claim 7, Koo et al. teach the capacitive structure (20) has a layer of material formed to adjoin a layer of insulation material, the layer of material being different from the layer of insulation material (see figures 2-4; column 5, lines 24 - 59).

Regarding claim 8, Koo et al. teach the capacitive structure is formed adjacent to a trench (see figure 4; the right hand portion of 36b is adjacent to the first portion of 32c).

Regarding claim 9, Koo et al. teach the capacitive structure is formed between a pair of adjacent trenches (see figure 4; the right hand portion of 36b is formed between a pair portion of 32c and 32d).

Regarding claim 22, Koo et al. teach the trenches are substantially straight (see figure 4; the first portion of 32c, 32d, 36b, 36c and 36d).

Regarding claim 23, Koo et al. teach a first trench contacts a second trench (see figure 4; the portion of 32d contacts the portion of 36d).

Allowable Subject Matter

7. Claims 6 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quang D Vu whose telephone number is 703-305-3826. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

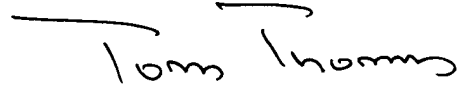
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QVU
July 1, 2002

Qk

A handwritten signature in black ink that reads "Tom Thomas". The signature is written in a cursive style with a horizontal line above the first name.

TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800